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Embargoes, Surplus Disposal, and U.S. Agriculture: A Summary

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ABSTRACT

Embargoes did not cause the farm crisis of the 1980's, and an aggressive export subsidy program to reduce surplus commodity stocks would not have prevented it. The cause more likely rests with radical changes in such worldwide economic conditions as recession, high interest rates, and the value of the dollar. The short-term embargoes of the 1970's, implemented to correct short supplies and high prices, stabilized markets and had little lasting effect on trade, prices, and farm income. The longer term 1980 USSR embargo, implemented for foreign policy reasons, barely changed U.S. and world trade levels, but did alter trade flows as the USSR replaced lost U.S. exports from other sources. U.S. policies to protect farmers from the cost of the embargo more than offset any immediate damage. A general export subsidy to dispose of stocks would be more expensive than existing programs although farm income would remain basically unchanged and world price variability would increase. If the subsidy's goal was to maximize income minus subsidy costs, targeted subsidies could do so at lower costs than current programs but would be difficult to implement and would not eliminate stocks. If the goal was to eliminate stocks, then targeted subsidies could not improve income sufficiently to offset Government costs.

PREFACE

This study fulfills a congressional mandate contained in the 1985 Supplemental Appropriations Bill. The bill directed the Economic Research Service (ERS) to conduct:

...a study to determine the losses suffered by U.S. farm producers during the last decade as a result of embargoes and the failure to offer for sale on world markets commodities surplus to domestic needs at competitive prices.

ERS enlisted the best academic authorities in a joint research effort to produce this study. The International Agricultural Trade Research Consortium, of which ERS is a member and sponsor, was used to identify and solicit participation of university faculty who are experts in international trade. This study, then, is the product of a team of agricultural economists from ERS, 14 universities, and one private research institution.

**EMBARGOES, SURPLUS DISPOSAL,
AND U.S. AGRICULTURE:
A SUMMARY**



**Economic Research Service
U.S. Department of Agriculture**

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This is a summary of a comprehensive study analyzing the effectiveness of export embargoes and surplus disposal programs. A listing of the contents of the full report appears on the inside back cover of this summary. Copies of this summary and the full report are available while supplies last from ERS Information (S), Room 208, 1301 New York Avenue, N.W., Washington, DC, 20005-4788. Or call (202) 786-1512.

FOREWORD

What effect have export embargoes had on U.S. agriculture? The many answers available to us demonstrate the great divergence of perceptions of policymakers, the general public, and agricultural economists. The popular perception is that embargoes, especially the 1980 embargo against the USSR, have been a major cause of declining exports, low prices, and the farm financial crisis. On the other hand, some economists have argued that, given the nature of world agricultural markets, embargoes are ineffective and that they have been a minor contributor to the problems faced by U.S. agriculture.

A second issue over which there is serious difference of opinion is whether the Commodity Credit Corporation, by not using available authority to sell surplus commodities on world markets at subsidized prices rather than accumulating stocks, has economically harmed the agricultural sector and increased the costs of price support programs. The argument is that CCC and farmer-owned reserve stocks have a price-suppressing effect on markets and reduce farm income and that this effect would be removed if surpluses were instead sold on world markets even at subsidized prices. Another argument is that it costs Government more to hold stocks than it would to subsidize disposal on world markets.

These debates must be correctly resolved, not to resolve an academic debate but because these issues underlie an important part of the debate on future U.S. farm and agricultural trade policy. Policies based on incorrect assumptions about the causes of current farm sector problems or about the effects of a new direction in management of surplus production can introduce new distortions in both domestic and international markets and create new and even more serious problems.

In 1985, Congress mandated that the Economic Research Service conduct analysis to resolve these two issues. Recognizing the importance of the issues and the necessity that the analysis be as comprehensive and objective as possible, ERS solicited participation of the best academic authorities in a joint research effort. The International Agricultural Trade Research Consortium (IATRC), of which ERS is a member and sponsor, was used to identify and solicit participation of university faculty who are experts in international agricultural trade. The findings presented here represent the most comprehensive, indepth analysis of these issues that the agricultural economics profession could provide, given constraints imposed by time, data, and analytical methods. The consistency and robustness of results derived from

alternative analytical approaches lend a degree of confidence to the conclusions that could not have been achieved with any single approach.

This analysis places export embargoes in perspective as one (and a relatively minor one) of several factors that converged to make the first half of the decade of the 1980's so disappointing and painful for U.S. agriculture. It also shows that subsidized export disposal of surpluses causes very different distortions in world markets, will not necessarily increase domestic prices, and under many conditions would have been more expensive to operate than the existing stocks program.

The process employed in this research may well be as important a contribution as the research findings themselves. A large team of agricultural economists from more than a dozen universities, one private research institution, and the Economic Research Service successfully defined and executed a research plan resulting in a comprehensive and, we hope, credible, published report on an important current problem on schedule and within about 9 months. It demonstrates what a cooperative effort among agricultural economists can accomplish given a defined goal, resources, and leadership. It should be used as a model for future efforts.

Many individuals contributed to this endeavor. Names, institutional affiliations, and role of contributors to the project follow. One individual deserves to be singled out for his contribution to the project. Alex McCalla was one of the three co-principal investigators and executive director of the project steering committee. In these roles, Alex provided the intellectual spark and the field generalship that kept the team moving toward the objective of a high-quality, useful research report. Without this kind of leadership, the process would not have worked.

JOHN E. LEE, JR.

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This report uses metric units throughout. Metric tons are referred to as tons. 1 metric ton = 2,204.6 pounds

EMBARGOES, SURPLUS DISPOSAL, AND U.S. AGRICULTURE: A SUMMARY

PRINCIPAL FINDINGS

This study presents results of comprehensive analyses of four U.S. export embargoes and possible programs of general and targeted export subsidies for 1970-84. It focuses on wheat, feed grains, oilseeds, and dairy products. Principal findings are:

- ***Embargoes of the 1970's.*** The general oilseed embargo of 1973 and the targeted sales suspensions of 1974 and 1975 did not last long and had predictable, short-term results. That is, they moderated high futures prices but generally had little effect on trade volumes, world prices, U.S. exports, and U.S. farm income. Foreign country response was limited. In fact, the embargoes were viewed as positive, market stabilizing forces by other countries.
- ***The 1980 Embargo Against the USSR.*** The 1980 embargo was a foreign policy action to punish the USSR. It was not meant to reduce high prices. Its longer duration (16 months) meant that success depended on cooperation of grain companies and competitive exporters. Early cooperation waned, and the effect on USSR meat consumption was minimal. The embargo did not significantly reduce USSR imports (at most, 3 million tons) or world trade. The USSR altered trade flows by replacing lost U.S. exports with the same or substitute commodities from other sources. Therefore, world prices and trade volumes changed little. Because of changed USSR behavior, the United States lost USSR market shares after the embargo. The United States also lost market shares throughout the 1980's, but likely more as a result of world economic conditions and foreign country response rather than the embargo. Policies implemented during the embargo to prevent U.S. farmers from bearing the cost of the embargo were more than successful.
- ***General Export Subsidies.*** The Commodity Credit Corporation (CCC) is authorized to sell surplus commodities on world

markets at competitive prices. This would require export subsidies. The United States has chosen not to go this route, relying instead on land set asides, commodity storage, and support prices. A dynamic analysis of the period beginning in 1973 was conducted on potential effects of a general subsidy program for wheat and feed grains which disposed of farmer-owned reserves (FOR) and/or CCC stocks. U.S. disposal of stocks would have cost more than existing programs, and farm income would have been basically unchanged. World prices would have been much more variable. A static analysis of dairy stock disposal reaches similar conclusions; disposal could be done, but it would be more expensive than current programs and would have little effect on dairy farmers' incomes.

- ***Targeted Export Subsidies.*** General subsidies apply equally to all destinations. The alternative is to determine if different subsidies targeted at particular destinations are preferable. It pays to subsidize price-responsive markets when other countries do not change their behavior. If the subsidy goal is to maximize farm income, minus subsidy costs, then targeted subsidies could do so at lower cost than general subsidies. If, however, the goal is to eliminate all stocks, then targeted subsidies do not raise farm income enough to offset government costs.

In both cases, effectiveness and cost of subsidy programs depend critically on two responses: How much importers respond to changing prices and whether competitive exporters retaliate. If the former is unresponsive and exporters retaliate, export subsidy programs are very expensive and move limited quantities. A range of assumptions is analyzed to illustrate the importance of these issues.

- ***Macroeconomic Effects.*** Embargoes did not cause the farm crisis of the 1980's and an aggressive export subsidy program to reduce surplus commodity stocks would not have prevented it. The cause more likely rests with radically altered macroeconomic conditions: The rising U.S. dollar, global recession, and high real interest rates. Our analysis suggests that if world economic conditions of 1979/80 had prevailed throughout the 1980's, U.S. exports, world prices, U.S. farm prices, and U.S. farm incomes would have been much higher and program costs would have been significantly lower. U.S. farm income depends heavily on national and global developments far removed from the U.S. farm sector.

BACKGROUND

U.S. agriculture faces its worst economic crisis since the Great Depression. The rapid growth and relative prosperity of the 1970's have faded to widespread stagnation and financial stress in the 1980's. Depressed international markets for U.S. farm products have replaced the strong export-led growth of the 1970's. Despite large increases in Government payments, many farmers face severe financial problems. The deteriorating economic position of U.S. agriculture is reflected in substantially reduced agricultural asset values.

Many factors have contributed to the change in U.S. agriculture's economic fortunes, and many remedies for agriculture's problems have been suggested. We have not attempted to analyze all factors leading to the present agricultural situation. This study analyzes one of the possible causes of agriculture's distress: U.S. agricultural export embargoes since the early 1970's. The study also analyzes a suggested solution: Disposal of surplus U.S. agricultural commodities by subsidizing exports in foreign markets. Given the operational methods of U.S. domestic agricultural price support programs, such price-competitive disposal would require some type of export subsidy. We also evaluate the effects of the changing macroeconomic conditions facing agriculture.

The study concentrates on the effects of export embargoes and surplus disposal on exports, farm prices, farm income, and Government program costs. It describes the four embargoes implemented since 1970 and determines their international and domestic effects in the short and long terms. In assessing implications of surplus disposal, the study evaluates the national and international effects, including costs, of major disposal options available to or through the CCC.

We focus on the commodities primarily affected by the embargoes (wheat, feed grains, and soybeans) in the embargo part of the study. We consider wheat, feed grains, and dairy products in the surplus disposal analysis because of their importance in CCC stocks.

The study covers 1970 to 1983/84 or 1984/85, depending on data availability. This period includes all four embargoes and is long enough to permit detailed assessment of the effects of alternative surplus disposal policies.

We used widely different methods of analysis to provide a com-

prehensive assessment of effects of U.S. export embargoes and surplus disposal. Such diversity is necessary because no single methodology can determine the short-, medium-, and long-term effects of embargo or disposal actions. A range of analytical methods allowed us to compare results and determine whether they provide a consistent assessment of the embargoes' effects. Such consistency adds weight to the conclusions drawn about effects of embargo or disposal actions. Finally, the limited time we had to conduct the study forced us to draw primarily upon existing economic models.

Numbers cited here need to be interpreted within the context of the model used to derive them. As in all quantitative economic analyses, results depend on the structure of the model employed, its assumptions, statistical validity of estimated parameters, and ultimately on data quality. Although this does not mean that selection of the model predetermines conclusions, it does imply that interpretation of results should be conditioned by how they were derived.

Estimates should be interpreted not as precise point projections but rather as indicators of general tendencies and orders of magnitude. Changes in prices, trade volumes, or farm income were derived from models that capture how economic actors respond to the changes in market conditions created by embargoes or surplus disposal. But these are all models in which a substantial number of other variables are assumed to be constant. Conditionality of the results must be recognized. Nevertheless, our results indicate the direction of the changes produced by embargoes and surplus disposal, and the general order of magnitude of these changes.

THE ECONOMIC SETTING

The effects of changes in world agricultural structure and policy and in the general economic environment must be isolated from effects of embargoes and the potential for surplus disposal. During the embargoes, other changes also influenced agricultural trade, prices, and U.S. farm incomes. Disentangling effects of the embargoes from effects of other forces is difficult, but vitally important. These other forces may have either compounded the embargoes' effects or offset them. Changes in market conditions also complicate historical analysis of the potential for surplus disposal. We place effects of embargoes and surplus disposal in perspective by simultaneously considering effects of the changing economic environment upon U.S. agriculture.

Changes in the economic environment facing U.S. agriculture fall into four general areas: (1) Structure of the agricultural sector, (2) world markets, (3) relevance and importance of macroeconomic conditions, and (4) farm policy.

Structural Changes in the U.S. Farm Sector

Increased specialization, growing reliance on purchased inputs, and greater dependence on foreign markets since the early 1970's have made farm income much more subject to influences from outside the agricultural sector. In the 1970's, agriculture became more productive, and incomes rose through the growth of larger, more specialized farms relying increasingly on capital-intensive production methods. Greater specialization means that farmers no longer have the diversity of onfarm enterprises to cushion a fall in prices of one commodity. Greater reliance on purchased capital inputs and debt accumulation has increased interest costs as a proportion of total production expenses, thereby linking farming more closely to factors affecting the entire economy. Exports in the past 10 years have accounted for 25-30 percent of farm cash receipts, compared with 10-15 percent in the 1950's and 1960's.

Changes in World Markets

U.S. agriculture benefited from rapidly expanding agricultural trade in the 1970's. This expansion was driven by income growth in developing countries and Eastern Europe and by changes in Soviet and Chinese policies that put greater reliance on imports to meet domestic food needs. The relative importance of traditional U.S. agricultural trading partners, such as Japan and Western Europe, declined as exports to developing and centrally planned countries increased. Variations in economic conditions or import policies of these countries are now vitally important to U.S. grain and oilseed producers.

Domestic and trade policies of importing and exporting countries increasingly influence world grain prices. Some policies attempt to protect domestic producers from foreign competition; others attempt to achieve "food security." The trend toward greater public intervention has especially affected the international wheat market. Because of some policies, domestic prices of many importing and exporting countries are largely disconnected from world prices. For example, a fall in world wheat prices is not passed to Japan's consumers because government border policies prevent it. Such policies can greatly inhibit effectiveness of an export subsidy policy. Public intervention also has increasingly

affected coarse grain markets, but soybean markets have remained relatively open.

Despite the importance of government policies and intervention, international grain marketing is a highly flexible, fluid, and technologically sophisticated system dominated by efficient transnational firms. Ability of private firms to use futures and forward markets for commodities, transportation services, and currencies permit the market to manage natural instability and to adapt to impediments of national governments. International markets are able to adjust quickly to changes from domestic economic conditions and government policies, such as an embargo affecting trade flows between two or more countries.

Changes in Macroeconomic Conditions

Two major factors affecting U.S. agricultural exports have been the rate of economic growth in importing countries and the value of the U.S. dollar. The dollar's value has varied substantially since the move from fixed to floating exchange rates during the early 1970's. Shifts in domestic macroeconomic policies have influenced exchange rates. The two oil price shocks of 1973/74 and 1979 were important factors in the domestic and global economies and in international trade.

During the 1980's, U.S. fiscal and monetary policies have affected the economic well-being of the U.S. farm sector. A combination of restrictive monetary policy and expansionary fiscal policy resulted in high real interest rates and an appreciation of the international value of the dollar. The restrictive monetary policy helped reduce the rate of inflation but contributed to domestic and global recession. Lower economic growth and high real interest rates precipitated a debt crisis in developing countries. Reduced economic growth and world liquidity problems depressed demand for imports of agricultural and other products. High value of the dollar depressed demand for U.S. exports. Weak demand and higher production expenses generated by increased interest costs squeezed agricultural earnings. High real interest rates made land a less attractive investment and contributed to a decline in the value of agriculture's most basic asset. U.S. agriculture was caught in economic circumstances resulting in major financial stress.

Changes in Farm Policy

Although U.S. farm policy legislation has changed in the past 15 years, the basic thrust of commodity programs has been con-

stant. Effect of these programs has varied with the changing economic environment. In the early 1970's, flexibility of U.S. price support programs allowed U.S. farmers to respond rapidly to expanding world demand for grain and livestock feed. During the early 1980's, reduced international demand, a strong dollar, and relatively high U.S. loan rates contributed substantially to reduced U.S. agricultural exports. The Government acquired grain stocks to support domestic prices. But, because of the importance of the United States in international markets, this Government stock accumulation effectively meant supporting world prices. The appreciating U.S. dollar and high and rigid loan rates provided an incentive for importers and competing exporters to produce more grain and oilseeds. Mechanisms for providing price and income support for the U.S. farm sector ultimately contributed to the loss of the very markets responsible for the sector's prosperity.

Changes in the setting within which agriculture operates significantly influenced effects of export embargoes and potential effects of surplus disposal. The four embargoes happened in different market contexts. Feasibility of the subsidized disposal of grain surpluses depends upon the prevailing market environment. Hence, economic setting is of paramount importance to this study.

TRADE EMBARGOES

The United States has used both general and targeted export embargoes for agricultural products. The 1973 general embargo on oilseeds and oilseed products restricted shipments to all foreign markets. The remaining embargoes were all targeted; that is, restricted to specific importers. The 1974, 1975, and 1980 actions were targeted against the USSR. The 1975 action also covered Poland.

A wide variety of analytical approaches was used to determine effects of the embargoes. We used economic theory to determine effects expected from the restriction of U.S. exports. For the analysis of the embargoes of the 1970's, which were of relatively short duration, we examined trade and price patterns to determine what trends were already underway and how these changed following the embargo. Public policy statements, embassy cables, and press reports during each action were analyzed. We interviewed individuals in key positions of authority at the time to determine how countries responded to the embargoes. We used the same methods for the 1980 embargo, but its longer duration permitted us also to use quantitative economic models based on

annual or quarterly data to predict economic effects. These predictions were then evaluated in the light of actual events. We obtained estimates of the effect of the embargoes upon U.S. exports, prices, and farm income. To provide the fullest possible evaluation of likely effects, we employed models using alternative assumptions about price formation and the determination of trade flows and compared their results.

By drawing upon a range of methods using different economic assumptions, we determined whether alternative models lead to similar conclusions about implications of U.S. embargoes. Study results are broadly consistent. While each method provides a slightly different quantitative estimate of embargo effects, the general picture is the same. We are, therefore, confident in our qualitative conclusions.

The 1973 Oilseed Sales Restriction

The 1973 embargo of high-protein feedstuffs resulted from several global economic and policy changes that significantly altered the environment in which U.S. agriculture operated. The sector changed from one characterized by excess productive capacity and low, stable prices to one engaged in full production with high, unstable prices.

Despite record-high world soybean production in 1972/73, strong foreign demand and a sharp decline in world fishmeal production tightened protein meal supplies and caused soybean prices to rise rapidly. In June 1973, the domestic price of soybean meal was more than three times its year-earlier level. The rapid rise in prices threatened to disrupt domestic livestock production and to thwart the President's anti-inflation efforts. Political pressure to limit agricultural exports to control prices was considerable.

The sales restraint was announced on June 27, 1973, after months of rising soybean prices and increasing concern about the adequacy of domestic supplies. The embargo prohibited all U.S. exports of soybeans, soybean meal and cake, soybean oil, cottonseed, cottonseed meal and cake, and cottonseed oil. The embargo was replaced 5 days after the announcement with an export licensing procedure that lasted until October 1, 1973. Licenses were initially issued for 50 percent of the unfilled balance for verified soybean export contracts and for 40 percent of the unfilled balance for soybean cake and meal contracts. However, licenses for 100 percent of the volume called for in soybean meal contracts were issued from August 1, and licenses were issued for 100 percent of the volume called for in soybean contracts from

September 1, 1973. Hence, export restrictions were in place for about 1 month for soybean meal and 2 months for soybeans.

The U.S. decision to embargo apparently was not influenced by possible foreign repercussions to the action, and U.S. foreign policy advisors were not consulted before sales were restricted.

Short-Term Effects

The immediate results of a total sales restriction by a major exporter are to raise prices on the world market where supplies are reduced and to lower prices in the domestic market where supplies are increased. Following the 1973 sales restriction, prices for soybeans and meal in such major international centers as Rotterdam rose and domestic U.S. prices fell sharply. The divergence between U.S. and Rotterdam prices was short-lived, however. After July, Rotterdam soybean and soybean meal prices declined. The persistent decline in both U.S. and Rotterdam prices implies that the market was already weak before imposition of U.S. export restraints. Uncertainty and speculative pressures fueled rapidly increasing prices before the embargo. The embargo broke the cycle of panic buying and speculation in the spring 1973.

Although overseas sales were restricted for several weeks, the restriction had little effect on U.S. soybean and soybean meal exports for the 1972/73 marketing year. Export sales in 1972/73 were smaller than in 1971/72, largely due to limited supplies and high prices rather than to restricted exports. Short-term effect of the embargo on U.S. trading partners was minimal. Japan, the largest U.S. customer, changed the seasonal pattern and product composition of its oilseed imports, but the overall volume of Japan's trade was unaffected. Possibly anticipating shortages, Japan purchased above-normal quantities of soybeans in the 6 months preceding the embargo. The restrictions also minimally affected other U.S. customers. Foreign buyers benefited from the lower prices resulting from the embargo.

If we assume that the decline in world soybean prices was entirely due to the embargo, the export restriction reduced cash receipts to U.S. soybean producers less than 1 percent. The sustained decline in prices after the embargo suggests that income would have dropped anyway; the embargo was merely the catalyst. Onfarm soybean stocks were so low that, even if prices had remained high until the September harvest, few farmers would have been able to take advantage of them. Cash receipts to U.S. soybean producers would have been less than \$52 million greater

if they had been able to sell the soybeans they had on hand between July 1 and September 1 at pre-embargo prices. Live-stock producers and consumers gained from the embargo to the extent that prices for protein feedstuffs and food were lower as a result.

Long-Term Effects

The 1973 embargo had little effect on U.S. agriculture and no detectable effect beyond the start of the 1974/75 crop year. Its short duration occurred under such tight market conditions that it precluded a long-term response by other countries. Even Brazil, the other major supplier, protected its domestic market by restricting soybean exports rather than taking advantage of the situation to increase its market share.

The embargo possibly altered importers' attitudes toward the reliability of the United States as a supplier, but probably did not significantly alter long-term import behavior of foreign purchasers. Japan's response, the most visible and vigorous, was mostly symbolic. A small Japanese Government stock of soybeans was established, but this stock has remained only large enough to satisfy demand for about 8 days. Japan's Government also financially supported trading companies' investments in overseas soybean production, but the amount of this investment and its results have been insignificant. Japan still relies heavily on the United States for soybean imports. But, Japan has used the embargo as a food security justification for continuing protective domestic agricultural policies.

Some members of the European Community (EC) have used the embargo to lobby for increased domestic production of oilseeds and the imposition of restrictions on soybean imports. However, the principal impetus for the EC measures is the problem created by soybean imports for the EC's high-priced grain policies rather than concerns about food security.

There is little evidence that U.S. competitors in the soybean market significantly altered their domestic or export policies to take advantage of the embargo. Prices were so favorable to exporters, even without the embargo, that the embargo could have added very little extra incentive to increase exports. Even with this incentive, Brazil's agricultural trade policies focused more on maintaining adequate domestic supplies and low domestic prices than on consistently encouraging exports of soybeans or meal. Brazilian export policy apparently did not change to take advantage of the 1973 embargo. On the contrary, Brazil imposed

its own restrictions on exports during the period and was an even less reliable supplier than the United States. Argentina's emergence as a soybean exporter in the mid-1970's also appears unrelated to the 1973 embargo. High prices, favorable growing conditions for soybeans, and Argentina's more liberal export policies were responsible for the increase in its exports.

Long-term effect of the 1973 soybean embargo on the competitive U.S. position in world markets and on U.S. exports was negligible. Supply and demand responses to the embargo were small. No significant policy response by a major soybean or soy meal trading country can be traced to the U.S. action. Main factors affecting international trade in soybeans and soybean products during the mid-1970's were strong demand in the face of reduced supplies of protein feeds and the consequent responses to high prices. The U.S. soybean embargo was only a minor disturbance in a highly volatile market.

The 1974 and 1975 Grain Moratoria

The USSR was a major source of the variability in grain market prices in the early 1970's. The 1974 and 1975 moratoria were targeted at this perceived source of the market disruptions. In this sense, the grain moratoria were surgical attempts to deal with the uncertainty of grain supplies without undermining confidence in the United States as a reliable supplier in the eyes of longstanding trading partners.

The 1974 sales moratorium was linked directly to deteriorating crop prospects in the United States and several other large grain trading countries and to extremely low U.S. stocks. Unfavorable weather in the United States reduced corn production and placed upward pressure on prices. Major U.S. trading partners were consulted extensively; they voluntarily agreed to restrain their purchases from the United States. The 1974 sales moratorium went into effect in October, when as a result of an attempted major purchase by the USSR, the President requested U.S. grain exporters to suspend contracts for delivery of 2.3 million tons of corn and 900,000 tons of wheat to the USSR.

Less than a year later, on July 24, 1975, a second sales moratorium was instituted to reduce effects on the grain market of the uncertainty generated by deteriorating grain production prospects in the USSR. The poor 1974/75 crop had resulted in low carryover stocks and left the U.S. and world grain markets highly vulnerable to supply shocks in 1975/76. Markets reacted strongly to reports in the summer that the USSR grain crop was deteriorating.

rating. Continued inflationary fears and disclosure of significant purchases by the USSR prompted the Secretary of Agriculture to call on the major grain companies to withhold sales first from the USSR and then from Poland. The 1975 moratorium was lifted after the United States signed separate 5-year, long-term trade agreements with both countries in the fall 1975.

Short-Term Effects

The 1974 and 1975 grain moratoria combined with several other developments to calm the cash and futures markets for grain. The 1974 suspension lowered Kansas City average monthly prices of wheat 11 cents per bushel between October and November. As the 1974/75 marketing year progressed, the supply situation eased with the weakening of feed demand in the United States and abroad. This was reflected in wheat prices declining from their presuspension level of \$5.47 per bushel to \$3.81 in June 1975.

The 1975 moratorium and a proposed U.S.-USSR long-term sales agreement in September 1975 also reduced pressure on prices. September 1975 wheat and corn prices at the farm level averaged \$4.11 and \$2.76 per bushel, but fell to \$3.58 and \$2.33 per bushel by November.

The effect of the moratoria on total U.S. exports was negligible. Although only 2.2 million of the 3.2 million tons of corn and wheat contracted for shipment to the USSR before the 1974 action were shipped in the 1974/75 crop year, the United States increased its sales to third-country markets. The 1975 moratorium did not hinder U.S. exports of wheat and coarse grains in 1975/76. Rather, sales reached an all-time high.

The effect of the moratoria on U.S. farm cash receipts also was negligible. The higher prices at the time the moratoria were announced would probably not have persisted in any case.

Long-Term Effects

Long-term effects of the 1974 and 1975 moratoria are difficult to measure precisely but appear to be limited. The USSR imported large volumes of U.S. products after the moratoria until the 1980 embargo. From 1976/77 to 1978/79, the United States supplied an annual average of 71 percent of USSR grain imports. USSR grain purchases averaged over 10 million tons, well in excess of the 6-million-ton minimum specified in the long-term grain agreement.

The most obvious policy change resulting from the 1974 and 1975 moratoria was the signing of the U.S.-USSR long-term grain agreement in October 1975. This began an era of greater U.S. Government management of export quantities, at least with Eastern Bloc countries, which had become substantial sources of uncertainty and instability in Western grain markets in the early 1970's. This agreement provided greater information about production and import demand in the USSR, key areas of uncertainty in the international grain market. The agreement helped importers and exporters make long-term production, consumption, and trade plans.

The moratoria raised questions about long-term reliability of the United States as a supplier, as did the 1973 embargo. But, because the moratoria were imposed after substantial consultation with other countries, U.S. trading partners generally saw the actions as part of a set of positive initiatives to stabilize markets. By stabilizing its domestic market, the United States really stabilized the world market by restoring world confidence in the United States as a reliable supplier. Moreover, in signing the USSR and Poland to long-term agreements, the United States helped reduce market uncertainty.

The 1980 Embargo to the USSR

Circumstances surrounding the 1980 U.S. embargo differed greatly from the earlier three actions. The 1980 embargo was a foreign policy action motivated by the USSR invasion of Afghanistan. Unlike the trade actions of the 1970's, concern about adequate domestic supplies was not a factor in the decision. Because it was a foreign policy action, conditions needed to lift the embargo, short of a USSR withdrawal from Afghanistan, were unclear.

The embargo, lasting nearly 16 months from January 4, 1980, to April 24, 1981, included a wider range of products (wheat, feed grains, soybeans, meat, dairy products, poultry, animal fats, and agrichemicals) than preceding embargoes. Grain was most important, accounting for almost 80 percent of the value of U.S. agricultural exports to the USSR in 1979. Yet, the embargo was only partial for grains because the United States honored the 1975 U.S.-USSR agreement. The USSR was allowed to import the 8-million-ton obligation specified in the fourth (1979/80) and fifth (1980/81) years of the accord.

President Carter wanted to make a strong statement that the

United States would not allow USSR aggression to go unanswered, according to our interviews with key officials of the period. Military responses were considered inappropriate, and diplomatic protests were considered inadequate. An agricultural embargo emerged as the most plausible alternative when a report by the Central Intelligence Agency (CIA) showed that a grain embargo would reduce USSR meat consumption 20 percent. The report assumed full cooperation from other exporters in not filling the void left from the withdrawal of U.S. grain from the USSR market and that USSR port capacity constraints and low domestic grain harvests would contribute to reduced livestock production. In contrast, a U.S. Department of Agriculture (USDA) analysis done at the time, but which, according to our interviews, probably did not enter into the decision to embargo, predicted only a 2- to 4-percent decline in USSR meat consumption assuming full cooperation from other exporters.

The embargo decision was based on two important conclusions from the analysis at that time. First, cooperation of other exporters and grain companies was essential. Second, grain companies and U.S. farmers would have to be compensated. If the embargo effect was to be as large as estimated by the CIA report, the decline in world grain trade would be significant and compensation to the U.S. farm sector would need to be large.

All but two trading firms agreed to cease shipping grain to the USSR in exchange for financial compensation. After a meeting with officials from other major exporting countries, only Argentina announced it would not cooperate. Australia, Canada, and the EC agreed to ship no more than "normal and traditional" amounts to the USSR during the embargo. In practice, "normal and traditional" provided considerable latitude for interpretation. For example, Canadian officials interviewed indicated that they thought Canada's commitment was for only the remainder of the 1979/80 crop year.

U.S. actions to compensate U.S. farmers for losses caused by the embargo included increased loan rates for wheat and corn. Call and release prices for grain in the FOR were also raised. First-year interest payments on corn entering the reserve were waived, and reserve storage payments were increased. The Government agreed to purchase 4 million tons of wheat, including 3.7 million tons withheld from the USSR, and to assume contractual obligation for up to 10 million tons of corn. In March, noneligible 1979 crop corn was allowed into the FOR, and the emergency loan program was extended to September 1981, making farmers eligible for \$2 billion in loan assistance. In July, loan rates were

increased again, an additional \$300 million of emergency funds were made available to farmers, minimum prices on FOR-held grain were made mandatory, and interest payments on FOR loans were waived.

The embargo's effect is difficult to assess even 6 years after its announcement. The United States clearly received less than full cooperation from other exporters, and USSR meat consumption did not decline by the amount the CIA predicted. Demand for U.S. agricultural exports also weakened in the years after the embargo, placing pressure on farm incomes. A number of simultaneous events and policy changes also affected world agriculture and U.S. trade. Assigning precise weights to causes of changes in trade or farm income is difficult, even after the fact. We used a variety of methods to examine effects of the 1980 embargo in order to gather as complete a picture as possible.

Short-Term Effects

We approached short-term effects of the 1980 embargo in two ways. First, from data, we examined changes after the embargo went into effect. We emphasized what happened to international trade, prices, and USSR agriculture during the early 1980's rather than the importance of the embargo as a source of the changes. Then, we presented what the embargo effects would have been if all other unrelated changes, such as crop shortfalls, policy shifts, and exchange rate changes, were held constant. This approach allowed us to isolate embargo-related trade and price effects from other factors.

The 1980 embargo denied the USSR 10-17 million tons of U.S. grain during the first year, representing the amount the USSR needed to obtain from other sources to prevent a decline in domestic consumption. The ultimate effect on the world market and the United States depends on the extent to which the USSR made up for the reduction in U.S. imports.

Two alternative responses were open to the USSR to reduce the effect of the embargo. Both would have had major implications for world grain trade and U.S. farmers. One alternative was to internally absorb the loss by reducing stocks as much as possible, slaughtering livestock in the short run, and cutting meat consumption in the longer run. These actions would have reduced the demand for grain in the world market and, without a compensating reduction in U.S. exports, would have depressed world prices. The other alternative was to replace embargoed U.S. grain with imports of grains and substitute commodities from

other exporters. If the USSR could replace all the grain simply by switching suppliers, world trade volume would not be affected and world grain prices would remain unchanged, except for some increase in transport costs. To the extent that the USSR substituted livestock products for grains, world grain prices would fall and livestock product prices would rise. The USSR primarily pursued the option of replacing U.S. grain with that from other suppliers and increasing imports of substitute commodities.

The embargo had little effect on USSR grain use. USSR wheat and coarse grain imports in the first year of the embargo were consistent with levels that might have been expected given previous import trends and estimated USSR grain stocks at the time. USSR feed use declined marginally, partly because of a policy initiated before the embargo to promote use of forage and nongrain feeds in livestock rations. Hence, reduced U.S. supplies were met largely by increased imports from other sources and reduced stocks.

The embargo did not significantly affect the volume of world grain trade. An examination of actual trade, and that predicted on the basis of trends before the embargo, does not reveal a strong embargo effect. At most, world grain trade fell 3 million tons, or less than 2 percent. Subsequent changes in volume of world grain trade appear to be due more to the supply/demand balances of major grain-trading countries and to economic factors unrelated to the embargo.

Grain-trading patterns realigned in 1980. The magnitude of this realignment for the wheat and corn markets is estimated in table 1, which shows the difference between actual 1980 trade flows and those that would have been expected if trends from the 1970's had continued. All major U.S. competitors sold more-

Table 1--Estimated change in exports between 1970-79 and 1980

Exporter	Wheat			Corn		
	USSR	Others	Total	USSR	Others	Total
Million tons						
Argentina	1.7	-1.6	0.1	1.7	-4.2	-2.5
Australia	2.2	-1.9	.3	NA	NA	NA
Canada	2.2	-.8	1.4	NA	NA	NA
EC	.6	.3	.9	NA	NA	NA
United States	-3.2	0	-3.2	-7.1	11.5	4.4
Other exporters	.9	-.6	.3	1.8	-3.7	-1.9
Total	4.4	-4.3	NA	-3.6	3.6	NA

NA = Not applicable.

than-expected quantities to the USSR. Argentina and Australia did this by diverting exports from other markets. Canada and the EC also increased their export volume to provide the additional supplies to the USSR.

The EC continued to ship some grain to the USSR after the embargo was imposed because previously issued export licenses could not be revoked. With this exception, the EC apparently complied during the embargo with its commitment made to the United States. Canada also complied with the embargo but only until the 1979/80 crop year ended in June. In the following crop year, Canadian exports to the USSR increased sharply. The Canadian Government officially announced its withdrawal from participation in the embargo at the end of November 1980. Australia substantially increased its exports to the USSR in 1979/80, but this increase was already specified in an existing long-term supply agreement between the two countries.

The United States reduced wheat sales to the USSR by 3.2 million tons and corn sales by 7.1 million tons. The United States was unable to make up its loss in the wheat market with larger sales to other markets. Increased U.S. corn exports to other markets helped to offset the decline in corn exports to the USSR. The reverse was true for the USSR; that is, the USSR made up the loss of U.S. wheat but could not replace U.S. corn.

The embargo changed the commodity composition of imports in the USSR and its sources of supply, trade data suggest. USSR imports of wheat, barley, and livestock products (grain-equivalent) sharply increased in 1980 (table 2). USSR corn imports dropped 4.4 million tons from 1979. The increase in livestock product imports was equivalent to an estimated 3.4 million tons of feed grains.

Table 2--USSR grain and livestock product imports

Commodity	1977	1978	1979	1980	1981	1982	1983	1984
Million tons								
Wheat	6.4	9.0	9.6	14.9	17.3	21.1	23.0	28.0
Barley	.1	.6	1.3	2.4	4.8	2.7	1.6	1.4
Corn	4.0	13.3	14.6	10.2	16.5	11.5	6.4	12.4
Other grains and livestock	.1	0	3.5	3.5	7.8	3.1	2.1	4.0
Livestock products ^{1/}	8.0	2.5	8.8	12.2	13.2	12.0	13.6	11.9

^{1/} Livestock products in grain equivalents.

U.S. market prices dropped immediately after the embargo was announced but returned to pre-embargo levels in less than 2 weeks. Prices declined again when harvests in the Southern Hemisphere hit records but rebounded as the weather worsened in the Northern Hemisphere that summer. Nevertheless, some farmers suffered a loss because they had to sell at temporarily depressed prices in order to get needed planting funds.

The embargo did not cause major short-term changes in world grain prices. The export prices of the two most affected exporters, the United States and Argentina, were remarkably stable during the embargo. However, comparison of quarterly wheat and corn export prices for the two countries reveals that Argentina obtained a price premium for its wheat and corn during 1980.

The USSR succeeded in replacing most of the embargoed U.S. grain, according to data on trade, supply, and use in the USSR. However, the USSR had to change its commodity mix of imports and had to pay a premium for Argentine grain to replace embargoed grain. World wheat and barley trade to the USSR increased at the expense of corn trade, and world livestock trade to the USSR increased at the expense of all grain trade. Our best estimate is that the embargo reduced USSR grain imports by no more than 3 million tons during 1980, after adjusting for the grain equivalent of higher imports of livestock products.

Although the most likely effect of the embargo was a 3-million-ton reduction in USSR grain imports in 1980, we also estimated minimum and maximum effects. We chose two extremes which bracket the most likely case: zero and 11-million-ton reductions in USSR imports.

A key determinant of the magnitude of the embargo's effect upon world trade and prices was the ease with which importers could shift their sources of supply of grains in the world market. Quality differences, political ties, contractual arrangements, and long-term agreements can inhibit trade adjustments to the shock of an embargo. Hence, two sets of computations were made: One assumes that wheat or coarse grains from one exporter substituted perfectly for wheat or coarse grains from another exporter, and the second assumes that wheat or coarse grains

from different exporters were less than perfect substitutes. Table 3 shows simulated effects of the 1980 embargo on U.S. prices, exports, and export earnings under both these assumptions and for the three assumed levels of USSR import reductions.

Estimates derived from models of world grain trade suggest that, even under the most pessimistic assumptions about the embargo's effects on U.S. exports, export prices of U.S. wheat fell no more than \$11-\$12 per ton, or 7 percent, in 1980. The embargo lowered coarse grain prices \$8 per ton, or 6 percent, in the same year. U.S. wheat exports declined 2.4 million tons, and U.S. coarse grain exports fell 6.3 million tons. These reductions would have generated a loss of export earnings of \$2.2 billion. These estimates were derived using two extreme assumptions: USSR grain imports fell 11 million tons as a result of the U.S. action, and grain available from alternative suppliers was an imperfect substitute for U.S. grain.

Under the most plausible assumption, that the USSR was deprived of 3 million tons of grain imports, the embargo lowered U.S. export prices of wheat 2-4 percent and export prices of coarse grains 1-3 percent. U.S. wheat exports fell 0.6-1.3 million tons, or 1.5-4 percent. Coarse grain exports dropped 1.4-2.9 million tons, or 2-4.5 percent. U.S. export earnings declined 3-8 percent, depending upon assumptions made about the degree of substitution between U.S. wheat and coarse grains and those of competitors.

The gross cost of the embargo to the U.S. Government was \$2.2 billion, but the net cost was lower due primarily to the subsequent resale of contracts purchased from grain companies. Immediately following the embargo, the Government spent \$500 million on buying and retendering sales contracts from exporting firms, \$1

Table 3--Effects of 1980 embargo on U.S. prices, exports, and export earnings under alternative assumptions

Assumptions		Wheat change in--		Corn change in--		Trade value
Market structure	Effect on USSR imports	U.S. prices	U.S. exports	U.S. prices	U.S. exports	
	Million tons	\$/ton	Million tons	\$/ton	Million tons	Mill. \$
Perfect substitute:						
	0	-0.94	-0.19	-0.19	-0.14	-98
	-3	-2.70	- .56	-1.85	-1.40	-498
	-11	-7.90	-1.64	-6.24	-4.71	-1,621
Imperfect substitute:						
	0	-4.98	-1.03	-2.44	-1.89	-756
	-3	-6.48	-1.34	-3.82	-2.89	-1,096
	-11	-11.45	-2.37	-8.31	-6.28	-2,232

billion on directly purchasing grain, and \$700 million on moving commodities into the grain reserve.

We used a model of the U.S. agricultural sector to estimate the effects of the embargo on U.S. farm prices, incomes, and Government program costs. The advantage of this model was that it could incorporate changes in farm policy and U.S. export levels in the wake of the embargo.

Changes in domestic farm programs as a result of the embargo put upward pressure on prices. The CCC expanded U.S. grain demand by purchasing and isolating 154.8 million bushels of wheat and 159.7 million bushels of corn from the market. The release price for wheat in the FOR was increased, and the loan rates for both wheat and corn were raised. Both these actions increased grain prices at the farm level in the years after the embargo.

When we incorporated these policies along with the trade effects of the embargo into the model of the U.S. agricultural sector, domestic policy changes dominated the trade effects. Even when we assumed the most extreme embargo-induced reduction in world trade (11 million tons), farm prices for wheat and corn were still 12 and 1 percent higher than with no embargo and no compensating change in farm programs in the 1979/80 crop year. A 3-million-ton reduction in world trade, with no compensating policy changes, did not affect wheat prices and it reduced corn prices by less than 3 percent in 1979/80.

Long-Term Effects

Procedures used to compute the short-term embargo effects are appropriate for comparing one state of the world with another, but they do not capture the possible long-term embargo effects. To analyze long-term effects, we used procedures to trace effects of the embargo on trade, stocks, and farm income over time.

In 1981, the year following the embargo, increased sales to other markets offset effects on U.S. exports of reduced grain sales to the USSR. Higher wheat sales to China helped compensate for loss of the USSR market. Argentina and other exporters increased corn shipments to the USSR, resulting in greater U.S. exports to Mexico and others. The U.S. share of the USSR market would probably have contracted even without the embargo as the period of detente faded and production capacity of competing exporters expanded.

The embargo has been at least partially responsible for a long-term change in the mix of USSR grain and feed imports. Wheat is substituted for corn as a feed grain because wheat can be obtained easily from other suppliers. The United States is the world's largest corn exporter, and a USSR return to the pre-embargo expansion of corn use would mean a return to U.S. sources of supply. The quarterly pattern of USSR wheat imports has changed to take advantage of greater Argentine grain availability in the first quarter. Oilseed imports have increased steadily, probably reflecting an attempt to improve livestock feed rations rather than the embargo's effects. USSR feeding practices now rely less on grain, with a 27-percent increase in use of nongrain feed supplies between 1979/80 and 1985/86. Given USSR grain production problems, this may have been the trend even without the embargo.

The USSR's shift away from U.S. supplies weakened after the embargo was lifted in 1981, although imports from the United States have not recovered to levels that could have been expected based on trends during the 1970's. The USSR is a price-conscious buyer. Statistical analysis suggests that the embargo increased USSR responsiveness to changes in the prices of corn and wheat. The embargo probably made the USSR more aware of the possibility of diversifying its supply sources and the cost savings this might produce. However, high U.S. grain prices in recent years have been as much a factor in the failure of the USSR to purchase U.S. grain as any residual effect of the embargo.

U.S. farmers were overcompensated for the shortrun embargo effects, which is not surprising since the offsetting policy measures were enacted in early 1980 when estimates of the embargo's effects were large. Depending on the economic assumptions made, net farm income increased between \$0.2-\$2.2 billion over 1979-84 as a result of U.S. policies to compensate producers.

Despite its immediate cost to the Government, the embargo reduced long-term costs of price support operations. Higher loan rates lowered the amount of deficiency payments to farmers. Higher feed costs reduced dairy production and costs of price support operations for dairy products. Although Government storage costs increased as a result of changes in the reserve program, the net effect of policy changes due to the embargo was to reduce long-term Government outlays an estimated \$0.3-\$1.5 billion.

Changes in domestic and international economic conditions had a

far greater long-term effect on the costs of Government support for agriculture and the financial health of the farm sector than did the 1980 embargo. Appreciation of the dollar against other major currencies and the reduced rate of world income growth during the early 1980's dramatically lowered U.S. grain and soybean exports. In the unlikely event that macroeconomic conditions existing at the end of the 1970's, such as higher income growth, lower inflation, and lower exchange rates, had continued, U.S. wheat exports would have averaged an estimated 18 percent higher between 1982 and 1984. U.S. soybean exports would have risen 20 percent, and corn exports would have risen 35 percent. As a result, export prices would have increased an estimated 16-20 percent over actual prices. Despite an average reduction in Government payments of \$7 billion per year, annual net farm income would have risen by an estimated \$1 billion. Effects of export embargoes on the U.S. agricultural economy have been minor compared with effects of changes in the global economic environment.

SURPLUS DISPOSAL

One suggested solution for the U.S. agricultural crisis is the disposal of Government-held stocks into the world market at competitive prices. In other words, subsidize U.S. exports from Government-owned or controlled inventories. Legal authority exists to sell stocks at competitive prices by using either general export subsidies or targeted export subsidies. General subsidies directly or indirectly reduce costs of U.S. exports to all importers. Targeted subsidies reduce costs to one or more selected importers.

The second part of this study, exploring whether using export subsidies during the 1980's could have increased farm income and reduced farm program costs, concludes that such subsidies would not have effectively accomplished these tasks. The study particularly assesses the potential for expanding disposal of stocks acquired or controlled by the CCC as the result of U.S. price support programs. Two major issues are addressed: The CCC's legal authority to increase its stock disposals over the past decade, and the consequences of such a policy. Effects on farm income reported here refer to the effect due to the disposal program only. Since it is a disposal of public stocks overseas, the effect on farm income is not great. The major farm income effect comes from the domestic price support program, not the export surplus disposal program.

As in the embargo analysis, a variety of theoretical and empirical

models were used to determine the domestic and international implications of U.S. subsidy programs. Estimates of the potential effects of surplus disposal on exports, prices, farm income, and Government program costs were derived. Based on these estimates, qualitative conclusions are drawn about the implications of increased use of U.S. agricultural export subsidies.

CCC Operations and Legislative Authority

The CCC has the primary role of supporting and stabilizing prices of a number of key commodities, including grain and dairy products. The CCC stabilizes and supports grain prices by making loans to farmers against their crops. When market prices fall below the loan rate plus the interest owed on the loan, farmers can pay their loans off to the CCC with the commodities instead of cash. The CCC also stabilizes and supports dairy prices by purchasing dairy products at announced prices to place a floor under the milk price.

When market prices remain below legislated loan rates for long, the CCC accumulates stocks of wheat, corn, and dairy products. When prices are low, inventories also accumulate in the FOR, a Government program to ensure greater stability of domestic and international supply. Combined CCC and FOR wheat stocks have exceeded a billion bushels several times in recent years. Corn stocks reached 2.5 billion bushels in 1982/83, and are much larger now. At times in the past 15 years, CCC butter purchases have reached 30 percent of production, 10 percent of cheese production, and 50 percent of nonfat dry milk production.

Stocks buffer price swings created by crop failures at home or abroad. But, when market prices remain low relative to support prices, inventories become large. Government inventory costs rise as storage costs rise. Furthermore, excessive Government stocks can overhang the market, depressing farm prices.

The CCC is authorized but not obligated to reduce its commodity stocks with a variety of programs, including domestic and international food aid, emergency relief programs, barter arrangements, and subsidized exports or export credits. The CCC operates many export subsidy programs that fall under two general categories:

- General subsidy payments, in cash or in-kind, on overseas sales to lower the cost to foreign buyers.
- Targeted subsidies in particular markets to offset subsidies offered by other suppliers or to satisfy some other need.

The CCC had the legal authority to implement a more aggressive program of stock disposal, particularly of CCC-owned stocks, during the late 1970's or early 1980's. Congress limited the CCC's ability to dispose of surplus stocks between 1982 and 1984. During those years, Congress removed the CCC's long-standing authority to competitively price inventories in foreign markets. This change did not affect export volume, however, because the authority was not being used at the time of its removal and was not used when reinstated. The CCC had other alternatives (including direct credit, loan guarantees, donations, export subsidies, and payment-in-kind (PIK) export enhancements) that permitted more aggressive use of Government aid for exports.

Options Considered

This study evaluates general and targeted subsidies to dispose of Government stocks of wheat, coarse grains, and dairy products in export markets. The period 1977/78 to 1984/85 was analyzed and, therefore, includes the recent years of substantial accumulation of Government stocks. The following disposal options were considered:

- An across-the-board, uniform export subsidy on all wheat, coarse grains, and dairy products that would lower the costs of U.S. exports to all foreign buyers, increase demand, and eliminate Government stocks.
- A set of targeted subsidies on wheat and coarse grains to increase farm income the largest possible amount using the smallest subsidy cost (hereafter, referred to as the option to maximize farm income).
- A set of targeted subsidies on wheat and coarse grains to dispose of all publicly-held stocks.

We considered four critical factors in analyzing export disposal options: Importer response, competitor response, surplus size, and farm program constraints. Importer response embodies how consumers and producers in importing countries react to lower prices and the extent to which trade policies permit transmission of lower world prices to the domestic market. If a small price decline substantially increases the quantity of U.S. products imported, then a small subsidy would be extremely effective in eliminating U.S. surpluses. However, if a large price decline is

needed to increase U.S. exports, then very large subsidies would be required to be very effective. Increased export quantities resulting from subsidies must at least compensate for reduced prices to make the policy cost-effective for the United States.

This study assumes that grain importing countries are moderately responsive to reduced import prices. This is a middle-ground assumption made by the study group after extensive discussion, since some economists argue that relatively rigid trade policies make these markets highly unresponsive to price changes, particularly in the short run. Others, however, argue that these importers are very responsive to price changes.

The second critical factor in the analysis is the response of competing exporters to U.S. subsidies. Exporters could respond in one of two ways, each with different implications for the United States. First, other exporters could allow their domestic and export prices to fall along with the decline in world prices resulting from the U.S. subsidy. In this case, subsidies would improve the competitive U.S. position and increase U.S. market shares at the expense of other exporters. The extent to which this happens will depend on how much producers in other countries reduce production in response to lower prices. Second, competitors could retaliate with subsidies of their own. If they merely choose to match U.S. subsidies in order to maintain their own export volume, the result would be a smaller expansion in U.S. exports because the United States would not displace shipments from other countries in foreign markets. To the extent that subsidized prices expand world imports, U.S. exports would increase. If, however, competitors retaliate against U.S. subsidies by offering larger subsidies of their own, a trade war could break out. The outcome of such an action is uncertain. U.S. exports could fall, and market share could be lost.

Our research led us to assume that most competitors would pursue the first option: They would do nothing and allow their exports to decline. However, we assumed that the EC would maintain fixed internal prices and increase its export restitutions (subsidies) throughout the study period in order to allow its export prices to follow the world price decline. We assumed that other competitors would not retaliate by changing their policies.

A third factor is the size of the surplus to be sold relative to the size of the world market. The larger the U.S. volume for disposal on the world market, the larger the subsidies needed to induce importers to purchase the quantity available. This has a number of implications for the disposal options considered. First, the year

in which a surplus disposal policy begins can affect the operation and results of the program. A disposal program initiated in a year when surplus stocks are not large could prevent further surplus accumulation. It would avoid the need to dispose of large quantities in a short period of time. Program costs are likely to be lower because the level of subsidy required will be less.

The final factor is the effect of farm program constraints on surplus disposal options. Government stocks are a function of legislated loan rates, release prices, and target prices. Relationship of these prices to the market price determines the size of the surplus and the rate at which it accumulates.

This study assumes that there would have been no PIK program in 1983/84 and 1984/85, but that other elements of U.S. farm programs would have been unchanged. Surplus disposal programs in the mid-1970's would have prevented stock buildup in the early 1980's. PIK, a stock reduction program, would not have been required had there been no stocks. Because stocks held by the CCC and in the FOR are considered public stocks, we analyzed the disposal of both CCC and FOR stocks.

General Export Subsidies

We examined effects of a general subsidy program for grains by evaluating a stock disposal program which did not allow surplus stocks to accumulate. Crop years 1977/78 through 1984/85 were examined. We present results for disposal of CCC stocks alone and for CCC and FOR stocks combined.

We examined effects of a general subsidy program for dairy stocks by considering two alternatives: The disposal program beginning in a year of low surplus stocks and the program beginning in a year of large stocks.

U.S. export subsidies to all markets would have raised U.S. export volume and market shares, but would have lowered world market prices and made U.S. exports more price competitive. In the short run, increased U.S. export volume would have increased the volume of the commodity moving into world markets. Because the United States is a significant supplier of grains and dairy products, world prices would have declined. As a result, the United States would need to pay a subsidy on all exports, commercial and Government. Without the subsidy payment on all exports, exporting companies would be unable to profitably acquire grain for export at the loan rate and compete with subsidized U.S. Government grain exports.

The general subsidy needed to eliminate all CCC wheat stocks over 1977/78 to 1984/85 would, in effect, cut world prices from \$0-\$38 per ton each year, an average of almost \$10 per ton (table 4). The subsidy needed for corn would have ranged from \$0-\$22 per ton, an average of \$6.30 per ton. The average annual cost of the subsidy program would have been \$418 million for wheat and \$376 million for corn. Note that 1977/78 was a year in which public stocks were low relative to recent years. Therefore, cost estimates are lower than if the program began in a year with high stocks.

Average subsidy costs per ton of exports in a disposal program is important in judging effectiveness of that program. Even more important to subsidy decisions is the mounting subsidy cost of each additional ton exported. A disposal program shipping 3.56 million tons of additional wheat per year from CCC surplus stocks would have cost an average of \$160 per ton annually (table 4). Additional corn exports of 7.61 million tons would have cost \$49 per ton. At a 1977-84 average price of \$124 per ton, wheat surpluses cost more to subsidize for export than they are worth. It would have been cheaper to give the surplus away or destroy it.

If both CCC and FOR stocks were included in the program, the average subsidy required would have increased to \$17 per ton for

Table 4--Average annual exports, subsidies, and net subsidy costs for the 1977/78-1984/85 crop years for the disposal of CCC and combined CCC and FOR stocks

Item	Units	Response of importers to lower prices			
		Medium response		High response	
		CCC stocks only	CCC and FOR stocks 1/	CCC stocks only	CCC and FOR stocks 1/
Wheat:					
Increase in exports	Mil. tons	3.56	5.99	3.66	6.02
Total exports	do.	42.14	44.57	42.24	44.60
Subsidy rate	Dol./ton	9.92	16.53	5.88	10.66
Net subsidy cost 2/	Mil. dol.	571.00	715.00	365.00	405.00
Cost per additional ton of exports	Dol./ton	160.30	119.36	99.70	67.35
Percent of annual price (\$124.52)	Percent	129	97	80	54
Corn:					
Increase in exports	Mil. tons	7.61	10.06	7.77	10.03
Total exports	do.	59.71	62.16	59.87	62.13
Subsidy rate	Dol./ton	6.30	10.63	4.72	8.66
Net subsidy cost 2/	Mil. dol.	371.00	554.00	278.00	414.00
Cost per additional ton of exports	Dol./ton	48.76	55.03	35.81	41.27
Percent of annual price (\$103.19)	Percent	47	53	35	40

1/ This case is not currently feasible since, under current law, farmers retain marketing rights for their FOR stocks.

2/ Gross subsidy costs net of storage costs and sales losses of the CCC if the sales price is less than the loan rate, adjusted for the value of inventories at the end of the period. Costs do not take into account any savings due to the elimination of the PIK program.

wheat and \$11 per ton for corn (table 4). When we assume that importers are more responsive to lower export prices, the subsidy required to dispose of CCC stocks would have been smaller, averaging \$5.90 per ton for wheat and \$4.70 for corn.

Assuming importers are only moderately responsive to price changes, we found that CCC stock disposal would have increased the export volume of wheat and corn approximately 9 and 15 percent compared with the export volume without the subsidy. The disposal would have reduced CCC stocks to zero, lowering total U.S. stocks 10 percent for wheat and 15 percent for corn. CCC stock disposal would have increased the U.S. share of the world wheat market 2.4 percent and the U.S. share of the world corn market 3 percent. Disposal of both CCC and FOR stocks would have increased U.S. wheat exports 15 percent and corn exports 20 percent. Wheat stocks would have fallen 50 percent, and corn stocks would have fallen 52 percent. U.S. share of the world wheat and corn markets would have increased 4 percent.

CCC stock disposal under the moderate price response assumption would have reduced the annual average value of U.S. wheat exports over the 8-year period \$44 million, but increased the value of corn exports \$341 million. The net effect of the changes would have been an increase in annual average export earnings of \$297 million. World wheat demand is only moderately responsive to a fall in price. In many countries, policy measures such as import quotas restrict trade and block the fall in world prices from consumers. As a result, a general subsidy program would probably lead to a greater decline in wheat export prices than an increase in export volume. Only if importers are highly responsive to price change would the value of U.S. wheat exports increase. Because world corn demand is more price responsive, both the volume and value of U.S. exports would increase with a general subsidy program.

A general export subsidy program would have reduced Government-owned stocks. But the program would not have significantly raised producer incomes because the assumed reduction in Government stocks through surplus disposal was simulated in such a way as to not significantly affect farm prices. Domestic market prices would have remained close to actual levels over the 8-year period, but export prices would have been lower and more volatile under the subsidy program. Loss of payments from the PIK program would have lowered net farm income \$3.5 billion over the period with the alternative disposal program in effect.

Additional net cost to the Government of disposing of all CCC stocks, after including savings from reduced storage costs, would have averaged \$571 million per year for wheat and \$371 million for corn. If FOR stocks were included, average cost to the Government would have increased to \$715 million for wheat and \$554 million for corn. Expenditures would have been as high as \$2.9 billion for wheat and \$2 billion for corn in some years.

The nature of the world dairy market severely limits the extent to which export subsidies could be used for dairy products. Unlike wheat and coarse grains, only a small proportion of dairy production enters world trade. The number of regular importing regions is small, and many countries have highly restrictive dairy-import policies, such as high price supports and nontariff trade barriers. In this market, the irregular disposal of surplus stocks presents particular problems. Disposing of surplus dairy stocks on the export market at whatever price they would bring would be more costly than accumulating stocks when world prices are low and expanding exports when prices are high.

A dairy surplus disposal program was evaluated for two periods: One beginning in 1974, a year of low surplus stocks, and one beginning in 1980, a year of high stocks. Table 5 compares annual average exports and budget outlays for 1980/81 to 1984/85 for the actual program and the two disposal alternatives. Dairy disposals increased under both simulated programs. Disposal of all dairy products in the 1974 program increased 123,000 tons, nearly 20 percent over the combined domestic and export disposals of the actual dairy program. Disposals in the 1980 program increased 234 million tons, or 33 percent. These programs cost more than the actual program, however. The 1974 program cost 9 percent more than the actual program, and the 1980 program cost 19 percent more. Only if Government

Table 5--Average annual disposal and budget cost of actual and simulated dairy disposal alternatives, 1980/81-1984/85

Commodity	Disposal programs					
	Actual		Initiated in 1974		Initiated in 1980	
	Disposal ^{1/}	Budget cost	Disposal	Budget cost	Disposal	Budget cost
	1,000 tons	Mill. dol.	1,000 tons	Mill. dol.	1,000 tons	Mill. dol.
Butter	138	266	137	275	165	315
Cheese	236	545	292	595	312	616
Nonfat dry milk	287	362	355	410	418	464
Total	661	1,173	784	1,280	895	1,395

^{1/} Includes domestic as well as export disposals.

Note: Budget outlays are in 1977 dollars and assume inventories are valued at the world price and surplus disposal occurs at the price the residual importer is willing to pay.

stocks were valued at zero would disposal be cheaper than the existing program.

We probably underestimated costs of the two alternatives, particularly for the program started in the high stock year of 1980. For nonfat dry milk disposals in 1980, the United States needed to expand its share of the world market, excluding intra-EC trade, from 31 percent to 84 percent to dispose of the accumulated surplus. The United States probably could not have found buyers for this great an increase in export quantities without substantially lowering prices below those used in the computation of subsidy costs. Program costs could be reduced if surplus disposal is managed so that stocks are released if market conditions are favorable, not necessarily in the year stocks are accumulated.

Retaliation by other exporters probably would increase U.S. costs of a general export subsidy program and reduce its effectiveness. Figures given above are low estimates because they assume that competing suppliers do not retaliate to maintain their market shares and because the surplus disposal program began in a year of low surplus stocks. Competitors would be likely to respond to a more aggressive U.S. export policy. Competitive subsidization would reduce the gain in U.S. market shares and reduce effectiveness of a general export subsidy in disposing of surplus U.S. stocks. Similarly, disposal of surpluses would be considerably more expensive if the program were initiated in a year after there had been substantial stocks accumulation.

Targeted Export Subsidies

Targeted subsidies to increase U.S. export volume likely cost less than general subsidies because a targeted approach captures the more price-responsive importers. Consumer demand in some countries is more sensitive to price changes. In other countries, government policies reduce import responsiveness to price changes. Markets also differ in the amount of U.S. competition from other exporters. Orienting the subsidy program toward those markets more responsive to price changes increases U.S. export volume more per dollar of subsidy than does a general subsidy.

A targeted export subsidy program can be used for different objectives. By exploiting differences in price responsiveness of importers, targeted export subsidies can increase U.S. exports to price-responsive countries. Such subsidies can also force the United States to subsidize its exports in other markets to defend its market shares. If the United States subsidized wheat sales to

Egypt, for example, Egypt would buy more wheat from the United States and less wheat from other countries. Other exporters would be forced to find other markets for their wheat. Export supplies available to these markets would rise and prices would fall. The United States consequently would be forced to subsidize sales to importers in the rest of the world to protect its market shares from the displaced grain of other exporters.

Two targeted subsidy cases were examined: One to dispose of all publicly held stocks and another to maximize farm income, or gross sales, minus subsidy cost whether stocks are depleted or not. These alternatives were analyzed with a reference year of 1980 and compared with a global, uniform subsidy (table 6).

The amount of a targeted subsidy varies by destination. For wheat, subsidies to maximize U.S. producer incomes are not very effective because the demand for wheat is relatively unresponsive to price. Therefore, wheat subsidies are small because using large subsidies, even when they are targeted to particular markets, barely increases imports. In 1980, subsidies of \$8.70 per ton would be needed for shipments to centrally planned countries, where our analysis shows demand was the most responsive and markets were shared with competitors. The largest subsidies to major importers were given to North Africa and the Middle East, \$13.60 per ton, because these markets were price sensitive and shared with the EC. Virtually every purchaser would receive some subsidy, but these would be small on average. Because of the higher demand responsiveness, export subsidies needed for coarse grains would exceed \$50 per ton, considerably larger than for wheat. The most price-responsive markets, where a shortage of foreign exchange limits imports or where the United States

Table 6--Subsidy rate and cost comparisons using higher elasticity and spatial equilibrium price discrimination model, 1980/81

Item	Unit	Global subsidy	Targeted subsidy for income	Targeted subsidy for disposal
Wheat:				
Increase in exports	Mill. tons	12.10	0.87	13.00
Total exports	Mill. tons	48.00	36.77	48.90
Subsidy rate	Dol./ton	59.22	5.17	63.40
Total subsidy cost	Mill. dol.	2,840.00	190.00	3,100.00
Cost per additional ton of exports	Dol./ton	234.71	218.39	238.46
Corn:				
Increase in exports	Mill. tons	19.96	21.23	25.80
Total exports	Mill. tons	83.50	84.77	89.34
Subsidy rate	Dol./ton	32.55	52.85	44.10
Total subsidy cost	Mill. dol.	2,720.00	4,480.00	3,940.00
Cost per additional ton of exports	Dol./ton	136.27	211.02	152.71

faces stiff competition, would receive subsidies of as much as \$70 per ton.

A targeted subsidy program to maximize income of U.S. grain producers would increase wheat exports 1 million tons, from 36 to 37 million tons, in 1980, and coarse grain exports 20 million tons, from 64 to 84 million tons. The larger increase in coarse grain exports reflects the greater price responsiveness of the coarse grain market. Most increased wheat and coarse grain exports would go to developing countries.

The targeted subsidies required to eliminate all public stocks would be larger (for wheat, considerably larger) than those needed to maximize income of U.S. grain producers. The amount of stocks available for disposal exceeds the export volume that would maximize farm incomes. Disposal of the additional quantity would require large subsidies. The smallest subsidy required to eliminate Government wheat stocks in 1980 would be \$59 per ton, and the largest subsidy would be \$79 per ton. In the coarse grain market, the subsidies required to eliminate Government stocks would range from \$35-\$79 per ton. Cost per additional ton of exports would be \$238 for wheat and \$152 for corn.

If the objective is to eliminate public stocks, U.S. wheat exports would increase 13 million tons, from 36 to 49 million tons, in 1980, while coarse grain exports would increase 25 million tons, from 64 to 89 million tons. The disposal program would allow the United States access to wheat markets in the developing countries and coarse grain markets in the Middle East. Coarse grain exports also would expand to Western Europe and other developed countries. In terms of reduced wheat stocks, this program would be more effective than the income-maximizing alternative. But the increase in coarse grain exports of the disposal scenario would be only slightly greater than the income-maximizing scenario because of the more price-sensitive behavior of importers and competitors.

Targeted export subsidies would increase U.S. export earnings from wheat and coarse grains. If targeted subsidies were used to maximize income of grain producers, export earnings for wheat would rise \$200 million, from \$6.2 billion to \$6.4 billion. Coarse grain earnings would rise from \$8 billion to almost \$9 billion. If subsidies were used to eliminate public stocks, export earnings for wheat and corn would increase \$8.5 billion for wheat and \$10.8 billion for coarse grains because exports would be larger.

Stock disposal under a targeted subsidy program would increase

farm prices and producer income. A policy to maximize producer income would increase producer receipts for wheat and coarse grains almost \$7 billion in 1980. However, if targeted subsidies were used to dispose of all Government stocks, income would increase much less, just over \$2 billion. Increased grain prices from a targeted disposal would reduce income of livestock producers, and the net effect on farm income, therefore, would be lower than these figures suggest.

Export subsidies would involve substantial Government expenditures. Thus, export subsidies are an expensive way to reduce surpluses. In 1980, the subsidies to maximize producer income would require Government expenditures of roughly \$4.7 billion. If the stock disposal objective were pursued, the expenditures in 1980 would total \$7 billion. Only when a set of income-maximizing subsidies is used would the increase in producer income exceed the surplus disposal cost to the Government.

Summary of Export Subsidies

Although some types of export subsidy schemes to reduce Government grain stocks might increase producer incomes, all options examined involve substantial Government costs. Estimates of Government expenditures given above likely underestimate substantially the costs, particularly under current conditions, where surplus stocks are large.

The cost of export subsidies is likely to be higher than estimated because other exporters would probably retaliate against U.S. export subsidies. Results presented above assumed that other exporters would match the decline in world prices caused by U.S. subsidies and allow the United States to increase its market shares. Most other major exporters would not react passively to U.S. subsidy programs, according to our interviews with key individuals in other countries. Competitors are likely to use countersubsidies to protect their market shares, particularly the EC which is unlikely to allow the United States to gain market share at its expense. The EC probably would retaliate against U.S. subsidies, particularly if these were targeted to EC export markets. Retaliation by other countries, such as Australia and Canada, is also possible. At the very least, competing exporters would be slow to reduce their exports in response to lower world prices created by subsidized U.S. exports. If competitors' exports did not fall, cost of disposing of U.S. surplus stocks would increase.

Although the results suggest that income gains for U.S. grain

producers might exceed the cost of targeted disposal, implementing a program that would achieve this result would be extremely difficult. Only with a complex set of subsidies to maximize returns to U.S. grain farmers would producer income gains exceed Government costs. Such a set of subsidies requires substantial information about likely responses of importers and U.S. competitors to alternative subsidies. It also requires that these subsidies be carefully chosen and timely applied. This analysis assumed that such information was available and that implementing an appropriate set of subsidies was possible. In reality, this would be an extremely difficult task.

A further factor is that the size of the stock disposal problem is currently greater than that considered in the period considered above. The United States has extremely large grain inventories and faces a worldwide climate of surplus and increased productive capacity. In this climate, the cost of surplus disposal would probably be much greater than that suggested by the above figures. As of May 1985, CCC and FOR wheat stocks amounted to 28.1 million tons, or 72 percent of last year's exports. Corn stocks in September 1985 stood at 15.5 million tons, or roughly 33 percent of exports. In recent years, world grain trade has stagnated. Disposing of this stock volume in the current international market environment would be difficult and expensive.

MACROECONOMIC EFFECTS

A major cause of the deterioration in the export market for U.S. grains and in the accumulation of surplus stocks has been the unfavorable macroeconomic environment: Rising U.S. dollar, global recession, and high real interest rates. U.S. grain export subsidies to dispose of surpluses would not have been considered if national and global economic conditions had not worsened in the early 1980's. If economic growth rates of the 1970's had continued into the 1980's and the dollar had not appreciated substantially, surplus stock accumulation would have been much more modest. In 1980-84, FOR corn stocks would have been eliminated in an estimated 3 out of 5 years, and CCC stocks would have been zero in the last 2 years. Although more favorable economic conditions would not have had the same effect on wheat stocks, exports and export prices would have been substantially higher. As a result, the need for export subsidies likely would have been reduced substantially. Changes in the world and national economies have significantly affected the income position of U.S. agriculture and have been major factors in the buildup of surpluses and program costs.

EMBARGOES, SURPLUS DISPOSAL, AND U.S. AGRICULTURE

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